

(12) INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

(19) World Intellectual Property  
Organization  
International Bureau



(43) International Publication Date  
13 January 2005 (13.01.2005)

PCT

(10) International Publication Number  
WO 2005/003478 A1

(51) International Patent Classification<sup>7</sup>: E04B 1/64, 1/70, 2/72, E04F 13/00, E04H 9/16

(72) Inventor; and

(75) Inventor/Applicant (for US only): EDKINS, David, John [NZ/NZ]; 568 Manukau Road, Epsom, Auckland (NZ).

(21) International Application Number: PCT/IB2004/002202

(74) Agent: SHELSTON IP; 60 Margaret Street, Sydney NSW 2000 (AU).

(22) International Filing Date: 5 July 2004 (05.07.2004)

(81) Designated States (unless otherwise indicated, for every kind of national protection available): AE, AG, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BW, BY, BZ, CA, CH, CN, CO, CR, CU, CZ, DE, DK, DM, DZ, EC, EE, EG, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MA, MD, MG, MK, MN, MW, MX, MZ, NA, NI, NO, NZ, OM, PG, PH, PL, PT, RO, RU, SC, SD, SE, SG, SK, SL, SY, TJ, TM, TN, TR, TT, TZ, UA, UG, US, UZ, VC, VN, YU, ZA, ZM, ZW.

(25) Filing Language: English

(84) Designated States (unless otherwise indicated, for every kind of regional protection available): ARIPO (BW, GH, GM, KE, LS, MW, MZ, NA, SD, SL, SZ, TZ, UG, ZM,

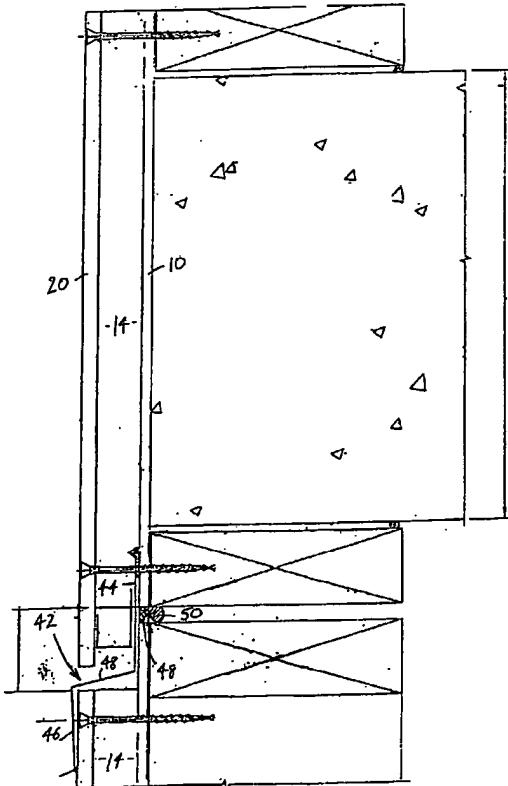
(26) Publication Language: English

(30) Priority Data: 2003903440 4 July 2003 (04.07.2003) AU

(71) Applicant (for all designated States except US): JAMES HARDIE INTERNATIONAL FINANCE B.V. [NL/NL]; Unit 04-07, Atrium Building, Strawinskylaan 3077, NL-1077 ZX Amsterdam (NL).

*[Continued on next page]*

(54) Title: RAINSCREEN APPARATUS AND METHOD



(57) Abstract: A rainscreen apparatus including a substantially rigid air barrier (10) adapted for attachment to a building structure, a rainscreen panel (20) adapted for attachment over the air barrier, a spacing member adapted to provide a clearance space (14) between the air barrier and the rainscreen panel and sealing means adapted to provide substantial pressure equalisation between within the clearance space.

WO 2005/003478 A1



ZW), Eurasian (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European (AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, HU, IE, IT, LU, MC, NL, PL, PT, RO, SE, SI, SK, TR), OAPI (BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, ML, MR, NE, SN, TD, TG).

*For two-letter codes and other abbreviations, refer to the "Guidance Notes on Codes and Abbreviations" appearing at the beginning of each regular issue of the PCT Gazette.*

**Declaration under Rule 4.17:**

— *of inventorship (Rule 4.17(iv)) for US only*

**Published:**

— *with international search report*

**TITLE: RAINSCREEN APPARATUS AND METHOD****FIELD OF THE INVENTION**

This invention relates to exterior cladding systems for both residential and commercial buildings and in particular a rainscreen apparatus, system and methods of manufacture and assembly.

The invention is directed particularly, but not solely to a rainscreen system having a means of pressure equalization with the external environment.

**BACKGROUND OF THE INVENTION**

Any discussion of the prior art throughout the specification is provided so that 10 the invention and the advantages of it may be better understood in an appropriate technical context, but should in no way be considered as an admission that such prior art is widely known or forms part of common general knowledge in the field.

Generally, when applying cladding or a rainscreen to a building frame, an air 15 barrier layer is first placed upon the frame. A series of battens are then placed atop the air barrier and attached to the frame underneath. Finally, a cladding material is typically fixed to the battens. The space behind the cladding is usually configured to allow ventilation and removal of any water that may enter the wall cavity. Water trapped in a wall cavity if allowed to remain or accumulate, can affect the durability of frame and cladding components.

20 In known cladding or rainscreen systems, a waterproof membrane such as housewrap, sarking or building paper is the sole air barrier placed upon the building frame. Entry of water, particularly wind driven rain, into buildings can be a problem when such systems are used in high wind areas or on the upper stories of low to medium rise buildings. This is because housewraps, sarking materials and the like are flexible 25 and may deform when exposed to wind or more generally when a pressure differential exists on opposite sides of the air barrier; allowing rain or liquid water to enter the wall behind the air barrier, particularly where adjacent sheets of sarking join or overlap, and thereby become trapped within the wall framing with little hope of removal.

What is needed is a cladding or rainscreen system for buildings that will better 30 protect the building frame from water ingress during periods of wind driven rain.

It is an object of the present invention to overcome or substantially ameliorate one or more of the disadvantages of the prior art, or at least to provide a useful alternative.

- 2 -

It is a further object of the invention in its preferred form to provide an improved rainscreen system and method that are less susceptible to the ingress of water during periods of wind driven rain.

It is a further object of the invention in its preferred form to provide an air barrier 5 for a wall cladding system that is suitable for use on low to mid-rise buildings.

#### SUMMARY OF THE INVENTION

In one aspect, the invention broadly provides a rainscreen apparatus including:

- 10 a substantially rigid air barrier adapted for attachment to a building structure;
- a rainscreen panel adapted for attachment over the air barrier;
- 10 a spacing member adapted to provide a clearance space between the air barrier and the rainscreen panel; and
- sealing means adapted to provide substantial pressure equalisation between the clearance space and the external atmosphere.

Preferably, the rainscreen apparatus includes an air vent to atmosphere from the 15 pressure equalised space to allow air pressure within the space to equalise with air pressure externally of the space. Preferably, the clearance space is sealed by the sealing means on the top and sides, and vented at the bottom, to prevent ingress wind forced rain.

Preferably, the rainscreen apparatus is suitable for use on building frames with 20 studs placed at predetermined intervals so as to resist water ingress with wind pressure up to a predetermined level. More preferably, the stud placement is between approximately 400 and 610 mm center to center. The predetermined wind pressure is preferably greater than approximately 1 kPa and less than approximately 4.5 kPa.

The substantially rigid air barrier may be comprised of any polymeric or 25 cellulosic or cementitious material suitably reinforced to provide the degree of rigidity required to resist water ingress when incorporated into a rainscreen apparatus and exposed to a predetermined wind pressure according to a standardized wind test.

In one preferred embodiment, the rigid air barrier is in the form of a panel. Preferably, the air barrier panel is between 2mm and around 15mm in thickness, and 30 more preferably 5mm-7mm thick. More preferably, the air barrier is a panel comprising oriented strandboard, plywood, metal or expanded polymeric foam, or a combination of these materials. Most preferably, the panel comprises fibre cement.

In one preferred embodiment, the air barrier is a panel that substantially prevents

liquid water from passing therethrough by attachment of a sheet of polymeric or substantially water repellent cellulosic material to the exterior surface of the panel. Alternatively, the air barrier is a panel having at least the exterior side treated with a material that repels liquid water. Alternatively, the air barrier is panel that contains a 5 water repellent material.

In another embodiment, the rigid air barrier is in the form of at least one thin sheet comprising a polymeric or substantially water repellent cellulosic material, the sheet having relatively rigid reinforcing means attached thereto. In one embodiment, the thin sheet is a substantially polyolefinic material having relatively rigid reinforcing 10 means comprising a mesh of fibreglass, metal or polymeric material laminated to at least one surface of the thin sheet. Alternatively, the relatively rigid reinforcing means may include a series of battens or the like laminated to at least one surface of the thin sheet.

The rainscreen may be of any exterior cladding known in the art. Preferably the rainscreen is in the form of a panel comprising a cementitous material, oriented 15 strandboard, plywood, metal, polymeric foam or a combination of these. More preferably the rainscreen panel may be between approximately 2mm-11mm thick, more preferably 7-11mm thick, and most preferably around 9mm thick. Preferably, the rainscreen panel comprises fibre cement sheet.

In a further aspect, the invention broadly provides a rainscreen air barrier joint 20 seal for sealing a joint between at least two adjacent air barrier panels of rainscreen apparatus, the seal including a sealing strip of a substantially resilient material having a first surface and a second surface opposite to the first surface, the first surface being adapted to contact the panels, and at least one batten provided in use over the second surface of the seal strip, the batten being in contact with the second surface so as to 25 maintain the first surface of the strip in contact with the region of the air barrier adjacent to the joint.

Preferably, the first surface has an adhesive provided thereon. Preferably the second surface has an adhesive provided thereon.

In a further aspect, the invention broadly provides a rainscreen flashing including 30 a first edge portion adapted to be located on or adjacent to a lower edge of an air barrier panel of rainscreen apparatus, a second edge portion adapted to be located on or adjacent to an upper region of a rainscreen panel provided below the air barrier panel, and a central portion which is contiguous with the first and second edge portions and is

- 4 -

provided at a substantially obtuse angle to the first and second edge portions.

Preferably, the central portion slopes downwardly to allow water to drain over the central portion and exterior to the rainscreen panel.

In a further aspect, the invention broadly provides a rainscreen vent for a 5 rainscreen apparatus having an air barrier panel and a rainscreen panel and a space therebetween, the vent including a first wall adapted for location on or adjacent to the air barrier panel, a second wall adapted to be located on or adjacent to an internal surface of the rainscreen panel, and a central portion connected between the first and second walls, the central portion having one or more apertures therein, the one or more apertures 10 allowing liquid to drain from the space and also allowing ingress of air into the space.

In a further aspect, the invention broadly provides a rainscreen seal construction including a batten for location on an air barrier of a rainscreen apparatus, a sealing member having a base and at least two lips projecting from the base, the lips being spaced from each other, one lip being adapted to make a substantially sealing contact 15 with a rear surface of a first rainscreen panel, and the second lip being adapted to make a substantially sealing contact with the rear surface of a second rainscreen panel, the second panel being located adjacent to the first panel.

In a further aspect, the invention broadly provides a method of constructing a rainscreen, the method including the steps of attaching a substantially rigid air barrier to 20 an external side of a building frame, attaching one or more battens over an exterior surface of the substantially rigid air barrier, and attaching a rainscreen panel over at least one of the battens.

Preferably, the substantially rigid air barrier is in the form of a panel. Preferably the panel is between approximately 2-15mm thick, and more preferably 5mm-7mm 25 thick. The air barrier may be formed from any suitable material including cementitious material, oriented strandboard, plywood, metal, expanded polymeric foam or a combination of these. Most preferably, the panel is formed from fibre cement.

Preferably, the rainscreen is in the form of a panel comprising a cementitious material, oriented strandboard, plywood, metal, polymeric foam or a combination of 30 these. More preferably the rainscreen panel may be between approximately 2mm-11mm thick, more preferably 7-11mm thick, most preferably 9mm thick. Most preferably, the rainscreen panel comprises fibre cement.

In a further aspect, the invention broadly provides a method for constructing a

- 4 -

provided at a substantially obtuse angle to the first and second edge portions.

Preferably, the central portion slopes downwardly to allow water to drain over the central portion and exterior to the rainscreen panel.

In a further aspect, the invention broadly provides a rainscreen vent for a 5 rainscreen apparatus having an air barrier panel and a rainscreen panel and a space therebetween, the vent including a first wall adapted for location on or adjacent to the air barrier panel, a second wall adapted to be located on or adjacent to an internal surface of the rainscreen panel, and a central portion connected between the first and second walls, the central portion having one or more apertures therein, the one or more apertures 10 allowing liquid to drain from the space and also allowing ingress of air into the space.

In a further aspect, the invention broadly provides a rainscreen seal construction including a batten for location on an air barrier of a rainscreen apparatus, a sealing member having a base and at least two lips projecting from the base, the lips being spaced from each other, one lip being adapted to make a substantially sealing contact 15 with a rear surface of a first rainscreen panel, and the second lip being adapted to make a substantially sealing contact with the rear surface of a second rainscreen panel, the second panel being located adjacent to the first panel.

In a further aspect, the invention broadly provides a method of constructing a rainscreen, the method including the steps of attaching a substantially rigid air barrier to 20 an external side of a building frame, attaching one or more battens over an exterior surface of the substantially rigid air barrier, and attaching a rainscreen panel over at least one of the battens.

Preferably, the substantially rigid air barrier is in the form of a panel. Preferably the panel is between approximately 2-15mm thick, and more preferably 5mm-7mm 25 thick. The air barrier may be formed from any suitable material including cementitious material, oriented strandboard, plywood, metal, expanded polymeric foam or a combination of these. Most preferably, the panel is formed from fibre cement.

Preferably, the rainscreen is in the form of a panel comprising a cementitous material, oriented strandboard, plywood, metal, polymeric foam or a combination of 30 these. More preferably the rainscreen panel may be between approximately 2mm-11mm thick, more preferably 7-11mm thick, most preferably 9mm thick. Most preferably, the rainscreen panel comprises fibre cement.

In a further aspect, the invention broadly provides a method for constructing a

- 5 -

rainscreen, said method including the steps of:

providing a substantially rigid air barrier panel;

coating the panel with a water resistant material;

attaching one or more battens over an exterior surface of the air barrier panel;

5       fixing a rainscreen panel over the battens so that the rainscreen panel is spaced from the air barrier panel; and

coating the exterior surface of the rainscreen panel with a substantially water resistant material.

Preferably, one or both of the panels may be fibre reinforced cement panels.

#### 10   BRIEF DESCRIPTION OF THE DRAWINGS

Preferred embodiments of the invention will be described, with reference to the accompanying drawings, in which:

Figure 1 is a front elevation of a two storey building structure;

15       Figure 2 is a front elevation of the structure of Figure 1 including an air barrier affixed thereto;

Figure 3 is an elevation of Figure 2 further including battens provided over the air barrier;

Figure 4 is a front elevation of the structure of Figure 3 and further including a rainscreen provided over the battens;

20       Figure 5 is a plan view of Figure 4;

Figure 6 is a side elevation and cross section of detail of A of Figure 4;

Figure 6A is an isometric sketch of a vent;

Figure 7 is a plan view and cross section of detail B of Figure 4;

Figure 8 is a plan view and cross section of detail C of Figure 4;

25       Figure 9 is a side elevation and cross section of detail D of Figure 4;

Figure 10 is a partial elevation of Figure 4 showing detail E;

Figure 11 is a side elevation and cross section showing detail F of Figure 4;

Figure 12 is a partial elevation of Figure 4 showing detail G;

Figure 13 is a sectional plan view showing detail H of Figure 5; and

30       Figure 14 is a plan view and cross section showing detail I of Figure 5.

#### DESCRIPTION OF PREFERRED EMBODIMENT

Figure 1 shows a building structure, having structural concrete supports in the form of concrete columns 1 and a suspended concrete floor 2. Between the

concrete structural supports, the framing generally referenced 4 is provided including studs 5 and nog 6. In this example, the framing is timber but those skilled in the art will appreciate that other framing materials may be used, for example steel frame materials. The structure in Figure 1 represents an exposed exterior structure of a building, 5 preferably but not necessarily a commercial building.

Turning to Figure 2, the first step in cladding the framing so as to provide a rainscreen according to the invention is illustrated in which an air barrier generally referenced 8 is provided. In the example illustrated, a number of separate panels are affixed to the framing in order to create the air barrier. The number of panels may vary, 10 for example a single panel could be used and the number of panels will vary depending upon the dimensions of the panels that are used and the area of the structure required to be covered. In Figure 2, 12 air barrier panels, each referenced 10 are shown. The panels are preferably fibre cement panels (for example Hardiflex® manufactured by James Hardie Building Products Pty. Ltd). However, panels of wood, wood composite (such as 15 oriented strandboard or plywood), metal, expanded polymeric foam or composite panels comprising these materials will also make suitable rigid air barrier. At the vertical joints between air barrier panels 10, a sealing strip 12 is provided as will be described in more detail below.

Alternatively, the rigid air barrier is in the form of at least one thin sheet 20 comprising a polymeric or substantially water repellent cellulosic material, said sheet having a relatively rigid reinforcing means attached thereto. In one embodiment, the thin sheet is a substantially polyolefin material having a relatively rigid reinforcing means comprising a mesh of fibreglass, metal or polymeric material laminated to at least one surface of the thin sheet. Alternatively, the relatively rigid reinforcing means is a 25 series of battens or the like laminated to at least one surface of the thin sheet.

In Figure 3, spacers in the form of battens 14 are shown placed over the air barrier. In this example, the battens are preferably constructed from a treated timber material and are preferably 50 mm x 20 mm in cross section. Those skilled in the art will appreciate that other materials may be used to provide spacers, for example 30 comprised of metal or polymeric composite. Further battens or spacers 16 may also be provided if necessary.

In Figure 4, the structure of Figure 3 is shown with rain barrier panels 20 affixed over the battens so that there are a number of spaces provided between the rainscreen

wall and the air barrier. Figure 5 shows the partial structure in plan view in which spaces between the air barrier and rainscreen panels are referenced 21. In Figures 4 and 5, the regions labelled A-H are shown in greater detail than the remaining figures.

Detail A is shown in Figure 6 from which it can be seen that the air barrier panel 10 is affixed at its lower edge by a fastener such as nail 22 to the bottom plate 24 of the framing assembly. An appropriate screw such as a 65 mm x 10g wood thread screw 26 affixes the rainscreen panel, the batten and the air barrier panel to the bottom plate. The nail 22 may also hold a vent strip 28 in location at the base of the screen. The rain barrier panel 20 preferably comprises a fibre reinforced cement panel such as that marketed under the trademark Titan™ or Exotec™. The preferred thickness of panel 20 is 7 – 11 mm, most preferably 9 mm. In Figure 6A the vent strip is shown in greater detail as an isometric sketch which reveals it has a number of apertures 30 in the base which have sufficient dimension to allow any water such as rain water in the space between the panels 10 and 20 to drain from that space, while also allowing air entry to the space so that the space may be pressure equalised in use and therefore resist ingress of water such as wind driven rain.

Turning to Figure 7, detail B of Figure 4 is shown in which the connection of the rainscreen arrangement to a stud 5 is shown. A screw or similar fastener 32 connects screens 10 and 20 and a batten 14 securely to the stud.

In Figure 8, a vertical joint between horizontally adjacent panels of the screen arrangement is illustrated. A sealing strip 34, which is preferably 50 mm wide and constructed from a resilient material such as an appropriate plastics or rubber material is laid over the joint between the adjacent air barrier panels 10. The sealing strip 34 is preferably coated with an adhesive on either side to assist with location under attention about the joint. The battens 14 (which may alternatively comprise a single batten if desired) are provided directly over an upper surface of the sealing strip 34 so that one side of each batten holds the sealing strip securely in place.

On the other side of the battens 14, a further sealing strip 36 is provided having a base 38 and two projecting sealing lips 40 projecting from the base. One lip 40 engages with the rear surface of each of the rainscreen panels 20. The arrangement is such that a substantial seal is made between the side edges of each of the panels 10 and 20.

Turning to Figure 9, detail D of Figure 4 is shown. In this figure, it can be seen that a flashing 42 is provided which has a first edge part 44 and a second edge part 46

for location on an air barrier panel and on an external surface of a rainscreen panel respectively. A central bridging portion 48 is angled at 90 degrees or more i.e. substantially obtusely to the edges 44 and 46. This provides a downwardly angled flow path, which allows any water within the spaces of the upper panels as shown in Figure 9 5 to drain out from between those panels and on to the exterior of the lower rainscreen panel shown in the figure. As well as allowing drainage, the flashing 42 also assists with sealing or at least protecting the seal between the lower air barrier panel and lower rainscreen panel. A seal created by sealant 48 over a backing PEF rod 50 for sealing vertically adjacent air barrier panels is also shown.

10 In Figure 10, detail E of Figure 4 is shown which again shows the seal strip 36 described above.

In Figure 11, which shows detail F of Figure 4, a joint between vertically adjacent panels as shown a short support batten 16 is used together with an aluminium socket 54 which screws 56 penetrate. A sealant 58 such as that sold under the trademark 15 Fosrock MS sealant or similar is used between socket 54 and the edges of rainscreen panels 20.

In Figure 12, the aluminium socket and sealant arrangement is shown in elevation in accordance with detail G of Figure 4.

16 In Figure 13, an external corner detail is shown in which it can be seen that a sealing strip 60, for example an 80 mm wide strip of substantially resilient material such as butynol is provided. In Figure 14, detail I of Figure 5 is shown in which it can be seen that a sealing strip the same as or similar to that described above with reference to Figure 13 may also be used to provide an appropriate seal at an internal corner.

The outer surface, i.e. the surface away from the framing, of the air barrier panels 25 10 is preferably coated with a substantially water resistant coating. Similarly, the exterior surface, i.e. the surface opposite battens 14 of rainscreen panels 20 is also preferably coated with a substantially water resistant coating.

From the foregoing it can be seen that an effective rainscreen system, particularly 30 a pressure-equalised rainscreen, together with an effective sealing arrangement is provided. The sealing arrangement allows the spaces between air barrier and rainscreen panels to be effectively sealed along the side and upper edges while providing a vent at the lower edge. In this way, air pressure within the spaces is equalised with exterior pressure such as that from wind for example. Therefore, there is no pressure differential

- 9 -

to force water such as raindrops carried by wind to enter the spaces behind the rainscreen. As a result, the rainscreen prevents rain from entering the building structure.

Where in the foregoing description, reference has been made to specific components or integers of the invention having known equivalents then such equivalents 5 are herein incorporated as if individually set forth.

Although this invention has been described by way of example and with reference to possible embodiments thereof, it is to be understood that modifications or improvements may be made thereto without departing from the scope or spirit of the invention.

10 It should be noted that various changes and modifications to the presently preferred embodiments described herein will be apparent to those skilled in the art. Such changes and modifications may be made without departing from the spirit and scope of the present invention and without diminishing its attendant advantages. It is, therefore, intended that such changes and modifications be covered by the appended 15 claims.

## CLAIMS:-

1. A rainscreen apparatus including:
  - 5 a substantially rigid air barrier adapted for attachment to a building structure;
  - a rainscreen panel adapted for attachment over the air barrier;
  - a spacing member adapted to provide a clearance space between the air barrier and the rainscreen panel; and
  - sealing means adapted to provide substantial pressure equalisation within the clearance space.
- 10 2. A rainscreen apparatus according to claim 1 including an air vent to atmosphere from said pressure equalised space to allow air pressure within said space to equalise with air pressure externally of said space.
3. A rainscreen apparatus according to claim 1 or claim 2 wherein said apparatus is suitable for use on building frames with studs placed at a predetermined interval
- 15 4. A rainscreen apparatus according to claim 3 wherein said studs are placed at between approximately 400 and 610 mm centre to centre and said predetermined wind pressure is greater than approximately 1 kPa and less than approximately 4.5 kPa.
- 20 5. A rainscreen apparatus according to any one of the preceding claims wherein said rigid air barrier is comprised of any polymeric or cellulosic or cementitious material suitably reinforced to provide the degree of rigidity required to resist water ingress when incorporated into said rainscreen apparatus and exposed to a predetermined wind pressure according to a standardized wind test.
- 25 6. A rainscreen apparatus according to any one of the preceding claims wherein said rigid air barrier is in the form of a panel.
7. A rainscreen apparatus according to claim 6 wherein said air barrier panel is between approximately 2-15mm thick.
8. A rainscreen apparatus according to claim 6 or claim 7 wherein said air barrier
- 30 9. A rainscreen apparatus according to any one of claims 6 to 8 wherein said air barrier panel includes fibre cement, oriented strandboard, plywood, metal, expanded polymeric foam or a combination of these.

10. A rainscreen apparatus according to any one of claims 6 to 9 wherein said air barrier panel is substantially formed from fibre cement.
11. A rainscreen apparatus according to any one of claims 6 to 10 wherein said panel includes a sheet of polymeric or substantially water repellent cellulosic material attached to the exterior surface of the panel so as substantially to prevent water from passing therethrough.
12. A rainscreen apparatus according to any one of claims 6 to 10 wherein said air barrier panel has at least the exterior side treated with a material that repels water.
- 10 13. A rainscreen apparatus according to any one of claims 6 to 10 wherein said air barrier panel includes a water repellent material.
14. A rainscreen apparatus according to any one of claims 1 to 5 wherein said rigid air barrier is in the form of at least one thin sheet comprising a polymeric or substantially water repellent cellulosic material, said sheet having a relatively rigid reinforcing means attached thereto.
15. A rainscreen apparatus according to claim 14 wherein said sheet includes a polyolefin material having a relatively rigid reinforcing means including a mesh of fibreglass, metal or polymeric material laminated to at least one surface of said sheet.
- 20 16. A rainscreen apparatus according to claim 14 wherein said sheet includes a polyolefin material having a relatively rigid reinforcing means including a series of battens or the like laminated to at least one surface of said sheet.
17. A rainscreen apparatus according to any one of the preceding claims wherein said rainscreen panel includes a cementitous material, oriented strandboard, plywood, metal, polymeric foam or a combination of these.
- 25 18. A rainscreen apparatus according to any one of the preceding claims wherein said rainscreen panel is between approximately 2-11mm thick.
19. A rainscreen apparatus according to any one of the preceding claims wherein said rainscreen panel is between approximately 7-11mm thick.
- 30 20. A rainscreen apparatus according to any one of the preceding claims wherein said rainscreen panel is around 9mm thick.
21. A rainscreen apparatus according to any one of the preceding claims wherein said rainscreen panel is substantially formed from fibre cement.

22. A rainscreen apparatus according to any one of the claims 1 to 16 wherein said rainscreen panel is formed from an exterior cladding material.
23. A rainscreen air barrier joint seal for sealing a joint between at least two adjacent rigid air barrier of the rainscreen apparatus according to any one of claims 1 to 5, said seal including a sealing strip of a substantially resilient material having a first surface and a second surface opposite to said first surface, said first surface being adapted to contact said rigid air barriers, and at least one batten provided in use over said second surface of the seal strip, said batten being in contact with the second surface so as to maintain said first surface of the strip in contact with the region of said air barrier adjacent to said joint.
- 10 24. A rainscreen air barrier joint seal according to claim 23 wherein said first surface has an adhesive provided thereon.
25. A rainscreen air barrier joint seal according to claim 23 or claim 24 wherein said second surface has an adhesive provided thereon.
- 15 26. A rainscreen flashing including a first edge portion adapted to be located on or adjacent to a lower edge of said air barrier of said rainscreen apparatus according to any one of claims 1 to 22, a second edge portion adapted to be located on or adjacent to an upper region of said rainscreen panel provided below said air barrier, and a central portion which is contiguous with said first and second edge portions and is provided at a substantially obtuse angle to said first and second edge portions.
- 20 27. A rainscreen flashing according to claim 26 wherein said central portion slopes downwardly to allow water to drain over said central portion and exterior to said rainscreen panel.
- 25 28. A rainscreen vent for the rainscreen apparatus according to any one of claims 1 to 22 having a rigid air barrier and a rainscreen panel and a space therebetween, said vent including a first wall adapted for location on or adjacent to said air barrier, a second wall adapted to be located on or adjacent to an internal surface of said rainscreen panel, and a central portion connected between said first and second walls, said central portion having one or more apertures therein allowing liquid to drain from said space and also allowing ingress of air into said space.
- 30 29. A rainscreen seal construction including a batten for location on an air barrier of rainscreen apparatus according to claims 1 to 22, a sealing member having a base

and at least two lips projecting from said base, said lips being spaced from each other, one lip being adapted to make a substantially sealing contact with a rear surface of a first rainscreen panel, and the second lip being adapted to make a substantially sealing contact with the rear surface of a second rainscreen panel,  
5       said second panel being located adjacent to the first panel.

30. A method of constructing a rainscreen apparatus according to any one of claims 1 to 22, the method including the steps of:  
attaching said rigid air barrier to an external side of building framing;  
attaching one or more battens over an exterior surface of said rigid air barrier;  
10       and  
attaching said rainscreen panel over at least one of said battens.

31. A method of constructing a rainscreen apparatus according to claim 30 wherein said rigid air barrier is in the form of a panel.

32. A method of constructing a rainscreen apparatus according to claim 31 wherein  
15       said air barrier panel is between approximately 2-15mm thick.

33. A method of constructing a rainscreen apparatus according to claim 31 or claim 32 wherein said air barrier panel is between approximately 5-7mm thick.

34. A method of constructing a rainscreen apparatus according to any one of claims 31 to 33 wherein said air barrier panel includes fibre cement, oriented  
20       strandboard, plywood, metal, expanded polymeric foam or a combination of these.

35. A method of constructing a rainscreen apparatus according to any one of claims 31 to 34 wherein said air barrier panel is substantially formed from fibre cement.

36. A method of constructing the rainscreen apparatus according to any one of  
25       claims 30 to 35 wherein said rainscreen panel includes a cementitous material, oriented strandboard, plywood, metal, polymeric foam or a combination of these.

37. A method of constructing a rainscreen apparatus according to any one of claims 30 to 36 wherein said rainscreen panel is between approximately 2-11mm thick.

38. A method of constructing a rainscreen apparatus according to any one of claims  
30       30 to 37 wherein said rainscreen panel is between approximately 7-11mm thick.

39. A method of constructing a rainscreen apparatus according to any one of claims 30 to 38 wherein said rainscreen panel is substantially 9mm thick.

40. A method of constructing a rainscreen apparatus according to any one of claims

- 14 -

30 to 39 wherein said rainscreen panel is substantially formed from fibre cement.

41. A method for constructing a rainscreen apparatus according to claims 1 to 22 including the steps of:  
providing said rigid air barrier;  
5 coating said air barrier with a water resistant material,  
attaching one or more battens over an exterior surface of said air barrier;  
fixing said rainscreen panel over said battens such that said rainscreen panel is spaced from said air barrier; and  
coating the exterior surface of said rainscreen panel with a substantially water resistant  
10 material.

42. A method for constructing a rainscreen apparatus according to claim 41 wherein one or both of said rigid air barrier or said rainscreen panel is substantially formed from fibre reinforced cement.

43. A rainscreen apparatus substantially as herein described with reference to any  
15 one of the embodiments of the invention illustrated in the accompanying drawings and/or examples.

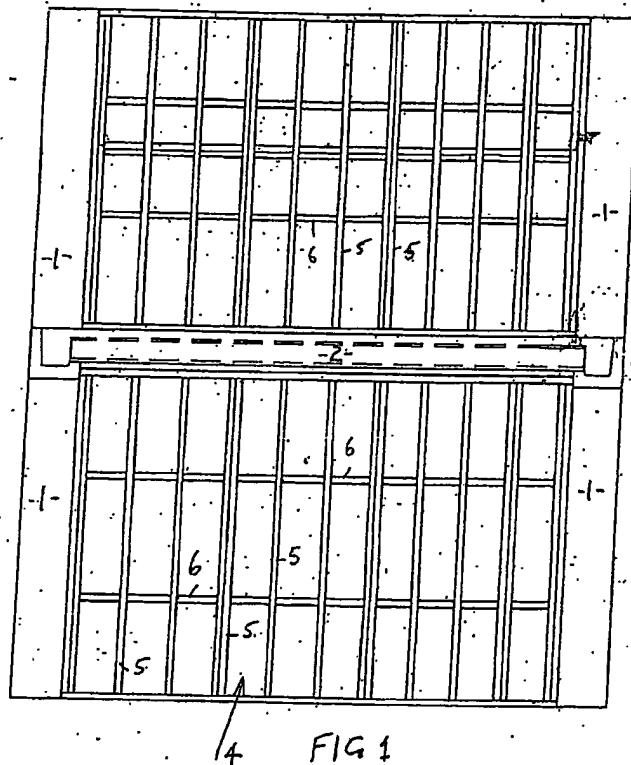
44. A rainscreen air barrier joint seal substantially as herein described with reference to any one of the embodiments of the invention illustrated in the accompanying drawings and/or examples.

20 45. A rainscreen flashing substantially as herein described with reference to any one of the embodiments of the invention illustrated in the accompanying drawings and/or examples.

46. A rainscreen vent substantially as herein described with reference to any one of the  
25 embodiments of the invention illustrated in the accompanying drawings and/or examples.

47. A rainscreen seal construction substantially as herein described with reference to any one of the embodiments of the invention illustrated in the accompanying drawings and/or examples.

48. A method of constructing a rainscreen apparatus substantially as herein described  
30 with reference to any one of the embodiments of the invention illustrated in the accompanying drawings and/or examples.



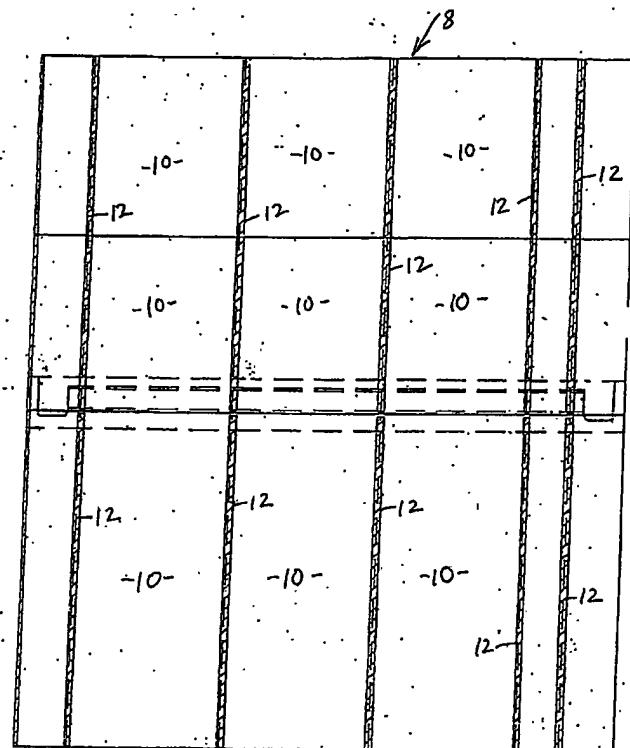


FIG 2

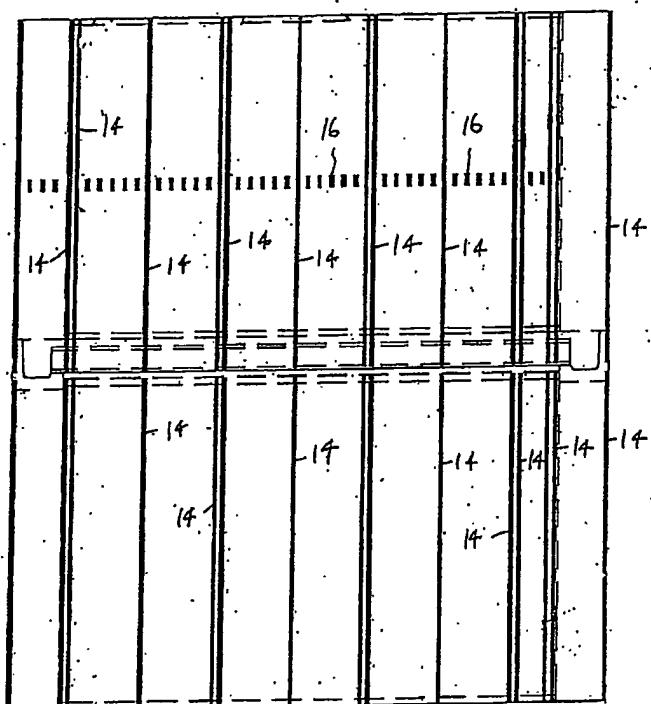
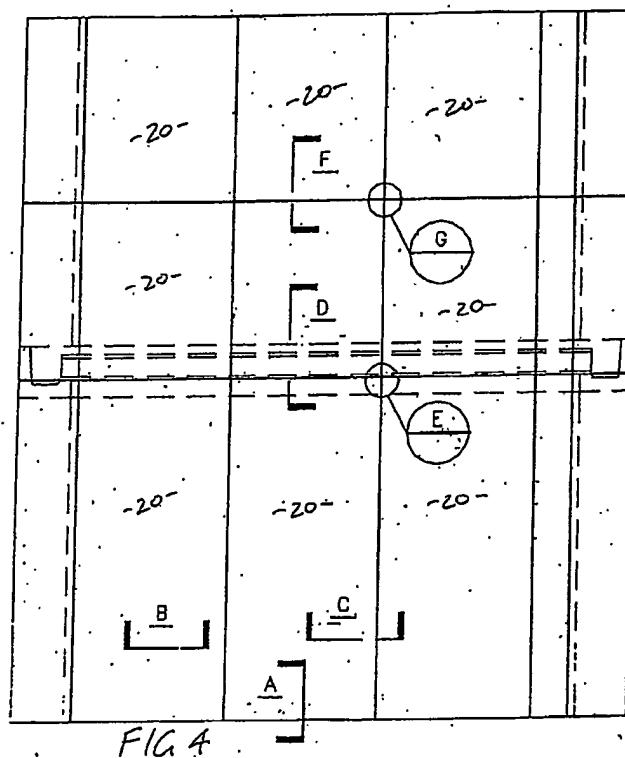
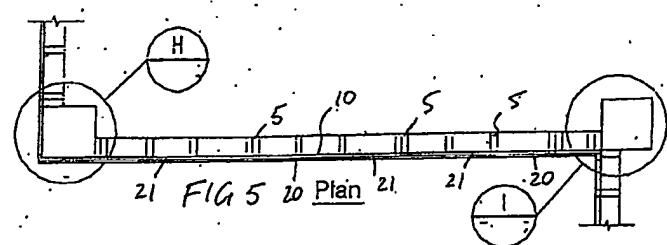


FIG. 3



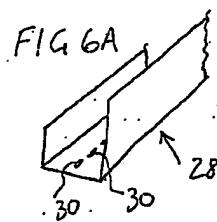
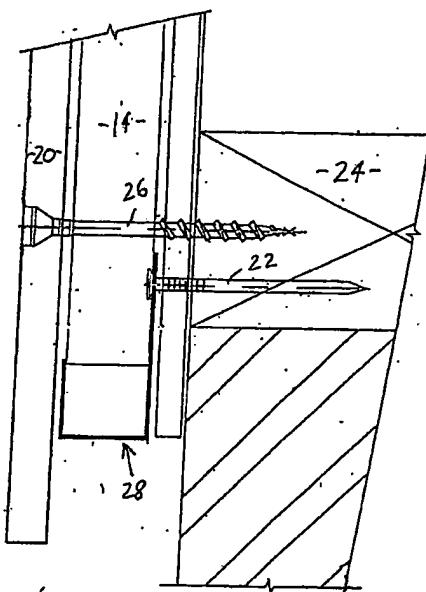


FIG. 6

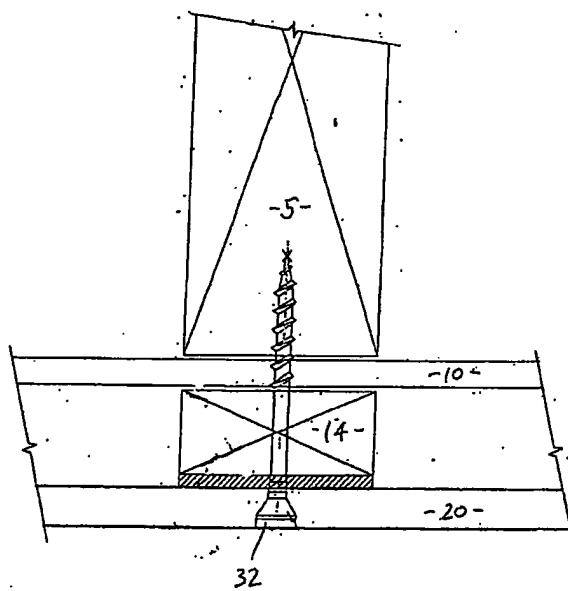


FIG 7

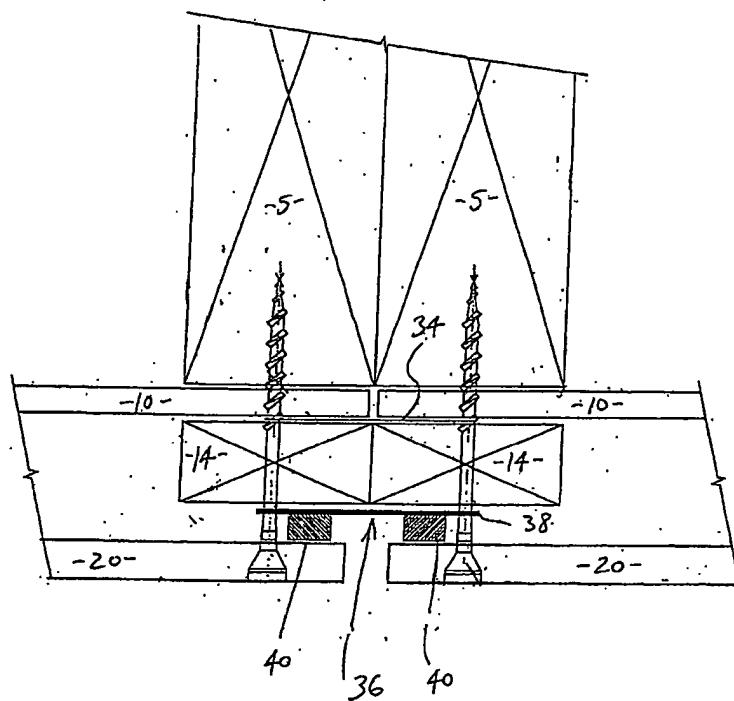
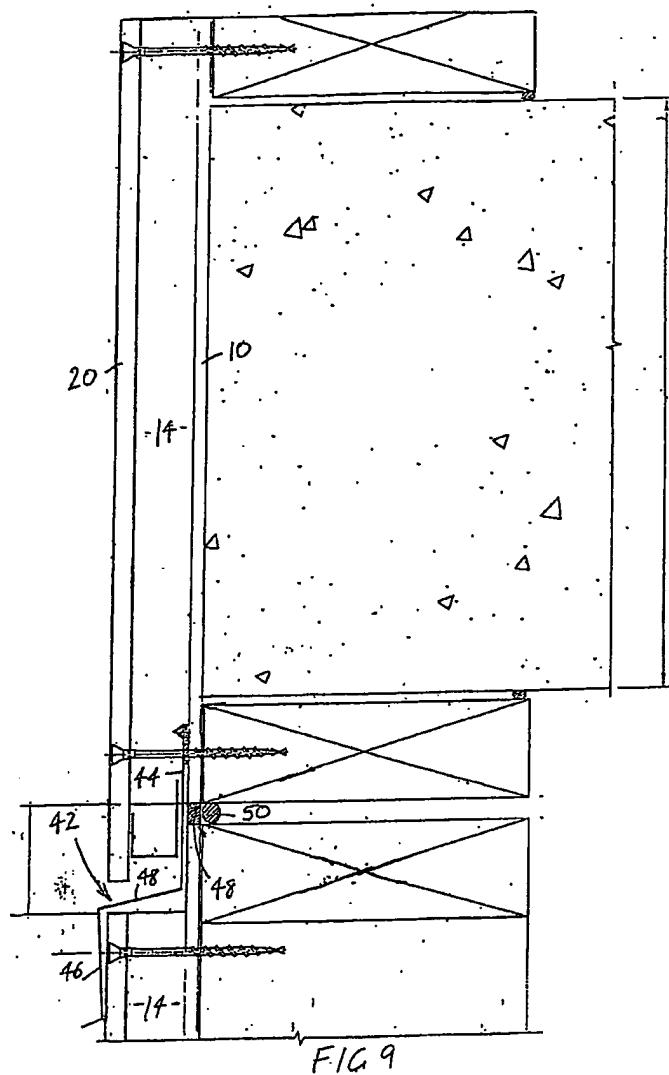


FIG. 8



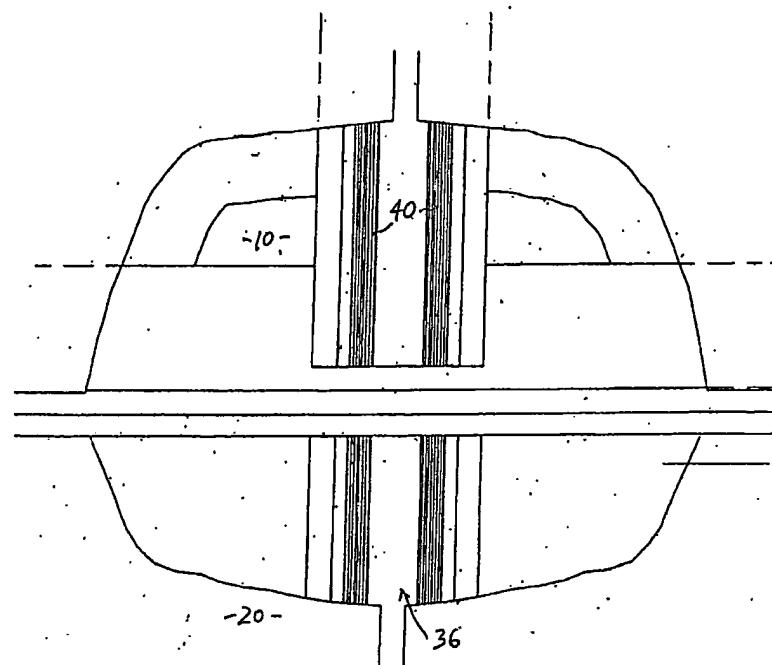


FIG 10

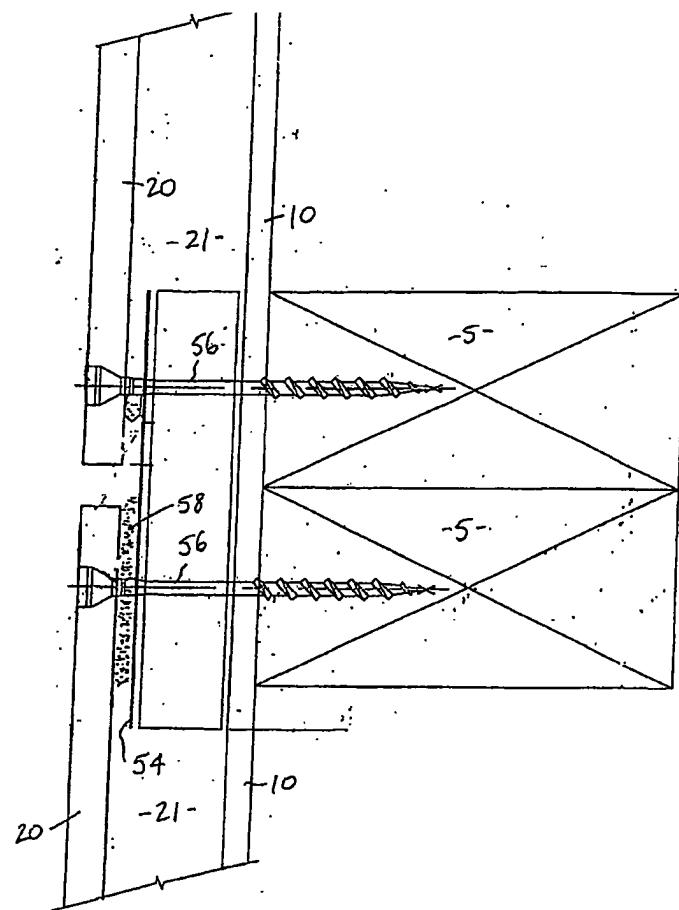


FIG 11.

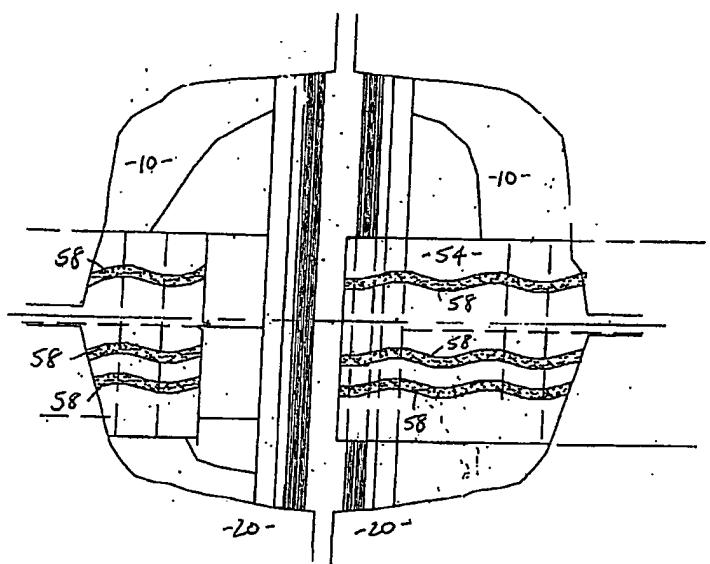


FIG. 12

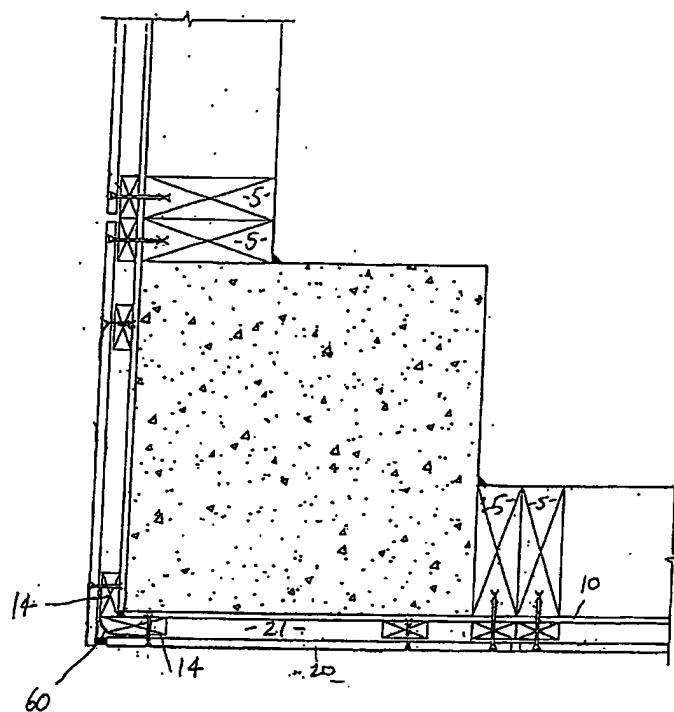


FIG 13

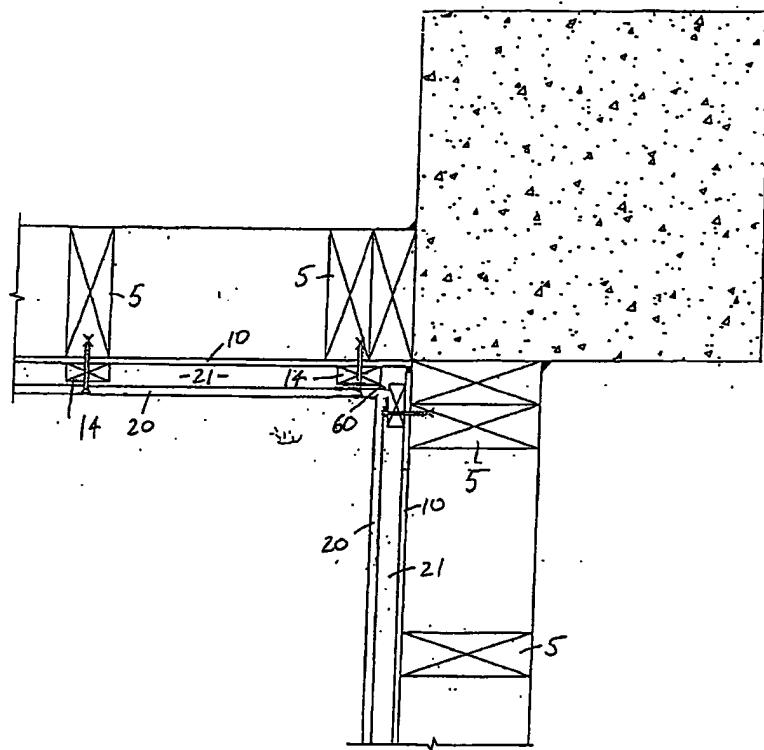


FIG 14

## INTERNATIONAL SEARCH REPORT

International application No.

PCT/IB2004/002202

## A. CLASSIFICATION OF SUBJECT MATTER

Int. Cl. 7: E04B 1/64, 1/70, 2/72, E04F 13/00, E04H 9/16

According to International Patent Classification (IPC) or to both national classification and IPC

## B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

REFER TO ELECTRONIC DATABASE BELOW

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

DWPI: &amp; keywords: rain, proof, air, gap and similar terms.

## C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
P, X	US 6745531 B1 (EGAN) 8 June 2004 See figures 1-5 and column 5 line 1 – column 8 line 61.	1-13, 16-22, 26-28, 30-42
X,	US 6233890 B1 (TONYAN) 22 May 2001 See figures 3-8 and column 3 line 1 – column 4 line 67.	1-15, 17-22, 26-28
Y	CA 1298454 C (BABIENKO et al.) 7 April 1992	16, 30-42
X	See figures 5a – 5d.	1-13, 17-22, 26-28
Y	US 5027572 A (PURCELL et al.) 2 July 1991	16, 30-42
X	See figures 2 and 5.	1-13, 17-22, 26-28
Y		16, 30-42

 Further documents are listed in the continuation of Box C See patent family annex

* Special categories of cited documents:	
"A" document defining the general state of the art which is not considered to be of particular relevance	"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention
"E" earlier application or patent but published on or after the international filing date	"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone
"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)	"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art
"O" document referring to an oral disclosure, use, exhibition or other means	"&" document member of the same patent family
"P" document published prior to the international filing date but later than the priority date claimed	

Date of the actual completion of the international search  
12 October 2004Date of mailing of the international search report  
26 OCT 2004Name and mailing address of the ISA/AU  
AUSTRALIAN PATENT OFFICE  
PO BOX 200, WODEN ACT 2606, AUSTRALIA  
E-mail address: pct@ipaustralia.gov.au  
Facsimile No. (02) 6285 3929Authorized officer  
JOHN HO  
Telephone No : (02) 6283 2329

## INTERNATIONAL SEARCH REPORT

International application No.

PCT/IB2004/002202

C (Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT		
Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
Y	US 5826388 A (IRVING) 27 October 1998 See figure 2.	16, 30-42

**INTERNATIONAL SEARCH REPORT**

Information on patent family members

International application No.

PCT/IB2004/002202

This Annex lists the known "A" publication level patent family members relating to the patent documents cited in the above-mentioned international search report. The Australian Patent Office is in no way liable for these particulars which are merely given for the purpose of information.

Patent Document Cited in Search Report		Patent Family Member
US	6745531	NIL
US	6233890	NIL
CA	1298454	NIL
US	5027572	JP 3087441
US	5826388	NIL

Due to data integration issues this family listing may not include 10 digit Australian applications filed since May 2001.

END OF ANNEX